



PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of )  
CLIFFORD E. COTTON, III ) Art Unit: 2834  
Application No. 09/783,367 ) Examiner: Medley, Peter M.  
Filed: February 14, 2001 )  
For: APPARATUS AND METHOD FOR )  
ADJUSTING THE PRE-LOAD OF A )  
SPRING )  
Attorney Docket No. 99-617 )

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DECLARATION OF PRIOR INVENTION IN THE UNITED STATES TO  
OVERCOME CITED PATENT (37 C.F.R. 131)

Sir:

**Purpose of Declaration**

This Declaration is to establish completion of the invention in this application in the United States, at a date prior to October 31, 2000, which is the effective date of the cited art under 102(a) or prior to October 15, 1999, which is the effective date of the cited art under 102(e). The cited art is U.S. Patent 6,140,745 issued to Bryant and was cited by the Examiner.

The person making this Declaration is the inventor.

**Facts and Documentary Evidence**

To establish the date of completion of the invention of this application, the following attached documents are submitted as evidence: a copy of an Invention Notification Form submitted to the Caterpillar Intellectual Property Dept. by the inventor. From these documents, it can be seen that the invention of this application was made at least by the date

of September 16, 1999, which is a date earlier than the effective date of the cited art under either 102(a) or 102(e).

#### **Diligence**

Attached is a statement establishing the diligence of the applicant, from the time of the conception of the invention, to a time just prior to the date of the cited art, up to the filing of the application.

#### **Time of Presentation of the Declaration**

This Declaration is submitted prior to a final rejection.

#### **Declaration**

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

#### **Signature**

Full Name of sole Inventor CLIFFORD EUGENE COTTON III  
Inventor's Signature Clifford E Cotton III  
Date 10/08/02  
Country of Citizenship U.S. A.  
Residence U.S. A.  
Post Office Address 9814 E. 1900 N. RD  
PONTIAC, IL 61764



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STATEMENT ESTABLISHING DILIGENCE

The inventor and the assignee of the present application have been diligent in the preparation and prosecution of the pending application. As seen in the supporting documentation, the inventor fully conceived of the invention by at least September 16, 1999. The invention was sent to the Intellectual Property Department of Caterpillar Inc, the assignee of the application. Over the next sixteen months, the invention was processed in the Department, searched, and an application was drafted and reviewed. At no time during these sixteen months did the inventor or the assignee cease or unnecessarily delay the preparation and filing of the pending application.

Full Name of sole Inventor CLIFFORD E. COTTON III

Inventor's Signature Clifford E. Cotton III

Date 10/08/02

Country of Citizenship U.S.A.

Residence U.S.A.

Post Office Address 9814 E. 1900 N. RD.  
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Kelsey L. Milman  
Kelsey L. Milman  
Registration No. 42,895  
Intellectual Property Attorney  
Caterpillar Inc.

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**CATERPILLAR INVENTION DISCLOSURE FORM**Sheet 2 of 3

VII. Complete each of the following items in the space provided below and on continuation sheets as necessary.

- A. Identify the closest prior art of which you are aware and briefly point out any technical or economic advantages your invention provides over the prior art.
- B. Briefly state and discuss the problem or problems your invention is intended to solve or other reasons for its development.
- C. Disclose your invention by way of a sketch on this sheet or on an attached drawing and describe the best mode contemplated for carrying out your invention. Please affix reference numbers to drawings keyed to description where possible.

**Spring Pre-Load Variation By Means Of A Thermally Pre-Stressed Bender Actuator**

Springs, when used in assemblies and mechanisms, are generally assembled to a specified pre-load setting by use of a shim or shims. Since manufacturing identical parts (springs) is not practical, the variation in springs is accounted for by swapping shims of different thicknesses. The different shim thickness allows the pre-load to be increased or decreased simply by switching the shim. The downfall is that the assembly must be disassembled to accomplish this task. This invention is intended to address this issue. The shim could be substituted with a thermally pre-stressed bender actuator. The thermally pre-stressed bender actuator could be used alone or with any number of shim and actuator combinations.

Application of this invention to the HEUI-B would allow armature spring pre-load adjustment (see figure 1). This would be a major advantage in lowering injector to injector variability. Injector deliveries could be matched at the same operating points simply by adjusting the armature spring pre-load. To adjust the pre-load of the spring, one would have to vary the voltage that was applied to the bender actuator. The change in voltage would induce a change in the deflection of the bender actuator that would directly influence the spring pre-load.

The level of voltage applied to the bender actuator would vary from injector to injector. The spring pre-loads would not be the same in each injector, rather they would be tuned to produce equivalent injector deliveries.

Reference: U.S. Patent #5471721  
U.S. Patent #5632841

## VIII. Signatures:

Inventor(s)	Date
1) <u>Clifford E. Cotton, III</u>	<u>09/16/99</u>
2) _____	_____
3) _____	_____

Witnessed, Read & Understood By	Date
1) <u>[Signature]</u>	<u>09/16/99</u>
2) _____	_____

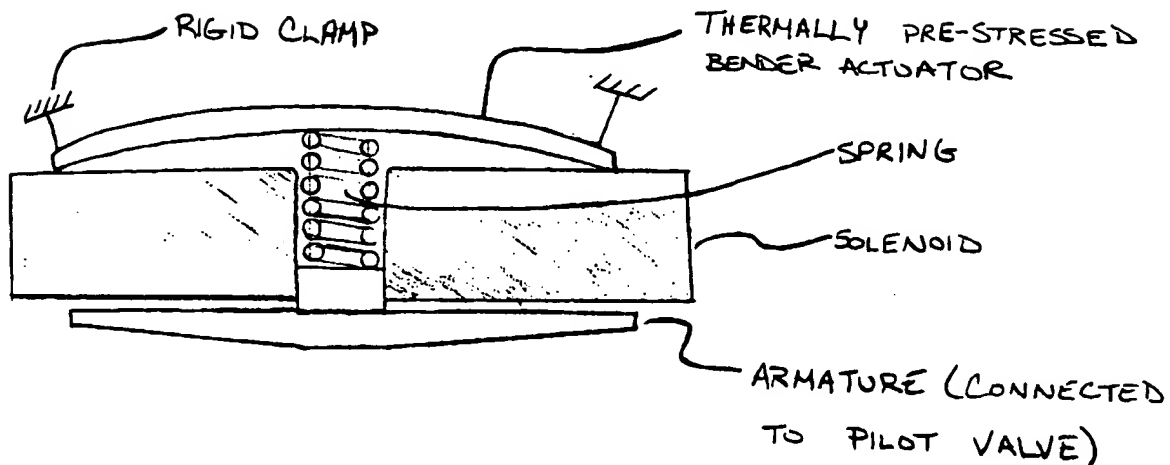
Reported by: \_\_\_\_\_

**CONFIDENTIAL—DO NOT COPY****CATERPILLAR INVENTION DISCLOSURE FORM**

Construction Sheet

Sheet 3 of 3

Fig. 1



## VII. Signatures:

Inventor(s)	Date	Witnessed, Read & Understood By	Date
1) <u>Clifford E. Cotton III</u>	<u>09/16/99</u>	1) <u>Robert L. Puffenberger</u>	<u>09/16/99</u>
2) _____	_____	2) _____	_____
3) _____	_____	Reported by: _____	_____